

- I. *Observations upon a Foetus, and the Parts of Generation of a Sheep. In a Letter to the Royal Society, from Mr. Leeuwenhoek, F. R. S. Translated from the Dutch by Dr. Sprengell, F. R. S.*

A Certain Butcher kept, about a League from this Town, several young Wethers at Grass, with one Ewe, which within two Years time had twice lamb'd. This Ewe being very fat, he resolv'd to kill; and to this end he brought it to another Pasture just by the Town, where he had several other young Wethers; but it happen'd, that among them there was one young Ram, which he judg'd to be about twenty Weeks old; this young Ram cover'd the Ewe in his presence; soon after which the Butcher kill'd the Ram, but left the Sheep about five Days longer in the Pasture before he kill'd it; out of which Sheep's Belly he said that he cut 28 Pounds of Fat. But observing, upon opening the Ewe, that the *Uterus* was four times bigger than ordinary, he brought the *Uterus*, with the *Ovaria*, to me, assuring me, that it was not yet quite five Days since the young Ram had cover'd the Sheep, and that there was no other Ram thereabouts.

This *Uterus* I put in an earthen glaz'd Pan, and cover'd it over, in order to dissect it next Morning, it being pretty late in the Evening when the Butcher brought it me. I then began first to try to penetrate into the Womb from the *Vagina*, with the Point of a  
 C c small

small Pair of Scissars, but I found it so close, that I could not enter it, therefore I cut a piece off from the Womb, out of which ran a clear Water, and within it lay the *Fætus* with all its Coverings. I spread this upon the backside of a *China* Tea-Dish, and finding that it still contained more Water, I made a small Incision to drain it, and to let it dry, that I might observe it the better. I could plainly see the *Vertebrae* of the Neck and Back, as also the Joints of its short Tail; I thought likewise that I saw the Eyes. But when it was quite dry, I could not observe its Backbone so well as before, when it was as yet moist, tho' the Painter, who made the Draught, and had sharper and younger Eyes than mine, saw the Bones of the Back very distinctly. My Design in drying it was to cut it in small Slices, that then I might the better observe the inner Parts, for it was so extremely soft and tender when moist, that with the least Touch its Parts would be disorder'd and confounded. Therefore I cut this *Fætus* into fifteen Slices, and observ'd them with a Microscope, but could not be very certain what I saw. I thought that I saw the Intestines, as also the Bladder; and coming to the Breast, I fancied that I saw the Heart; but I saw and observ'd, with a great deal of Pleasure, that two Blood-Vessels lay near together in the Brain, and how they were spread into Branches. I had this *Fætus* drawn as it lay in its Teguments. See *Fig. 1.* A B being the *Fætus*, and A C D E I K and A F G H L K, the Membranes wherewith it was involved, in the manner as I had spread and dried them, wherein the Blood-Vessels, as much as possible, are delineated. Now some Persons might expect, that I should have look'd for the Extremities of the Blood-Vessels: but no, the Blood-Vessels have no end, as I have frequently said. Besides, they  
become

become gradually so exquisitely fine, that the Blood which passes thro' them, can exhibit no red Colour to our Eyes; so that there is no tracing them when entering into the Vessels that return the Blood back to the Heart, except in living Animals, where one may see the Blood enter into the returning Vessels. Before the Butcher gave me this *Uterus*, he squeez'd it betwixt his Fingers, and told me that he could feel nothing in it; and this I believe he had done several times before, by which means he tore off the Vessels by which the *Fœtus* was fasten'd to the *Uterus*; which I suppose was the occasion that, upon opening the *Uterus*, the *Fœtus* with its Coverings came so easily forth.

I also took a Draught of the *Tuba Fallopiana*. See Fig. 2. M N O P. At P, is the imaginary Orifice, which is thought to suck the Egg from the *Ovarium*, according to the old absurd Notion; at M is shewn where the *Tuba* increases in Bigness, and at Q R the fleshy Substance, which I cut away from the *Uterus*. I then had also cut off the so call'd *Ovaria*, and the pretended *Ova*, which latter were much too big to think that they could pass upon Conception thro' the *Tubæ Fallopianæ*. I therefore took the length of the *Fœtus* with a Pair of Compasses, and measur'd it upon a divided Brass Rule, and this I did also as to its Breadth; I then took the middle Number between these, and multiplied it twice by itself, to bring it to a Cube Number. I next took the Length of the *Axis* of an *Ovum*, as it lay in the *Ovarium* inclos'd in its Membranes, and taking the Cube of that length, and dividing one Cube Number by the other, I found that such an *Ovum* was about seven times bigger than the *Fœtus*, notwithstanding it had had near five Days Growth. I shew'd this *Fœtus*, with its Covertures, to two Physi-

cians and one Surgeon, and I gave them the pretended *Ovaria* in their Hands, and they agreed, that not one *Ovum* was missing out of the *Ovaria*. Then I ask'd them what they thought? how it was possible that such an *Ovum* could pass thro' the Falloppian Tube? Whereupon the one said, that the *Ovarium* was quite out of doors, and that it was nothing but some fleshy Substance. But the other said, that notwithstanding this, all Animals came from an Egg, and the last told me, that he believed that Tube to be neither of a Sheep nor a Lamb; but I shew'd them that it was from an Ewe which at least had lamb'd twice, and yet that the Tube was neither thicker nor wider than the Tube of a Lamb. Here I could observe more than ever, how hard it is to bring Mankind off from their Prejudices, when once they have laid them down as Principles.

After having kept these *Ovaria* some Days, by which means they were pretty much shrunk in the drying, I order'd them to be drawn, that the Bigness of the Eggs might be observ'd. See *Fig. 3.* A B C D E is the *Ovarium*, which was on that side of the *Uterus*, in which the *Fætus* had lain. You must observe that the *Uterus* of a Sheep is divided by a Membrane, so that the young ones cannot touch one another. D E A is the part where it was fastened. In this *Ovarium* you may observe a round Protuberance, which is beset with several others; this great Protuberance is what is called an *Ovum*. This *Ovarium* is not here represented so large, as it was, when I cut it off from the Parts that it grew to. There was besides, at one side of that *Ovarium*, a large round Body, grown to the *Ovarium*, which seem'd also to be an *Ovum*. This is delineated in *Fig. 4.* F G, on which there appear'd several other little round Bodies protuberant from it. Now on the other side of the *Uterus*, there was a large

large fleshy prominent *Ovum* (as it is call'd) which might plainly be observed without a Microscope, whose Bigness is likewise drawn in *Fig. 5.* at *H I*, upon which you may likewise observe a smaller round Body, and out of that again other still smaller round Bodies appear protuberant. After I had quite dried these Eggs, represented in *Fig. 3, 4* and *5*, I still observ'd more and more of the prominent round Bodies upon them, insomuch that upon one of them, I told sixteen round little Bodies, whereof some, by losing all their Moisture, were sunk in and had a Dent in the middle. Furthermore, I cut these Eggs, with a very fine sharp Knife, into thin Slices, and then observing them with a Microscope, I saw Blood-Vessels in them, and also other sorts of Vessels, which I did not take for Blood-Vessels, and among the rest one so big, that a Hair of ones Head might enter it, besides abundance of others exceeding small. After many Observations, I could think no otherwise, but that the so call'd Eggs consisted of nothing but Vessels, and that the superfluous Moisture, which was sent to these Eggs, did not circulate (except only what was in the Blood-Vessels) and by overcharging the Vessels did elevate them into these small Protuberances, and sometimes bursting them, did thereby leave a Dent in the middle; which Dent having been observ'd by some Persons, they firmly believ'd, that that was the Place where the *Ovum* was suck'd out, from whence sprung the *Fætus*. I was very sorry that I did not get this *Uterus* without its having been squeez'd, for I do not question, but that I might otherwise have plainly discover'd all the Members of this *Fætus*, since I could plainly observe its Backbones even with the naked Eye, and that in a *Fætus* not of quite five Days Growth. I hope after this, nobody will pretend to say, that the Animal *in Utero*

at the Beginning, is nothing but an unform'd Mass. These Observations I made in the Month of *September*, 1718.

*Delft, June 13.*

1722.

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II. *Observations upon the Callus of the Hands and Feet, by the same curious Gentleman. Translated by John Chamberlayne, Esq;*

**I**N the Month of *September*, 1719. feeling an acute Pain in one of my Feet, at the Joint between the Foot and the little Toe, which I imagined to proceed from the more than usual Thickness of the *Callus* or hard Skin, upon that part; I caus'd my Servant, partly with his Nails, and partly with a Penknife, to take off that hard Skin, and let it fall upon a blue Paper, that I had set my Foot upon.

This *Callus*, or hard Skin, was compos'd of little scaly Shivers lying upon one another, and the whole Piece was as large as a small Nail of a Man's Hand.

I view'd the said Shivers thro' a Microscope, but could not satisfy myself, because they lay so irregularly on each other.

Moreover, I took a little Bit of the aforesaid hard Skin, laid it on a clean Glass-Plate, steep'd it in pure Rain-Water, and gently dividing it with a Piece of a Quill, I was amaz'd to see into what a vast Number of Particles it separated, and that with as much Readiness, as if they had never been join'd.

Afterwards

FIG. I.

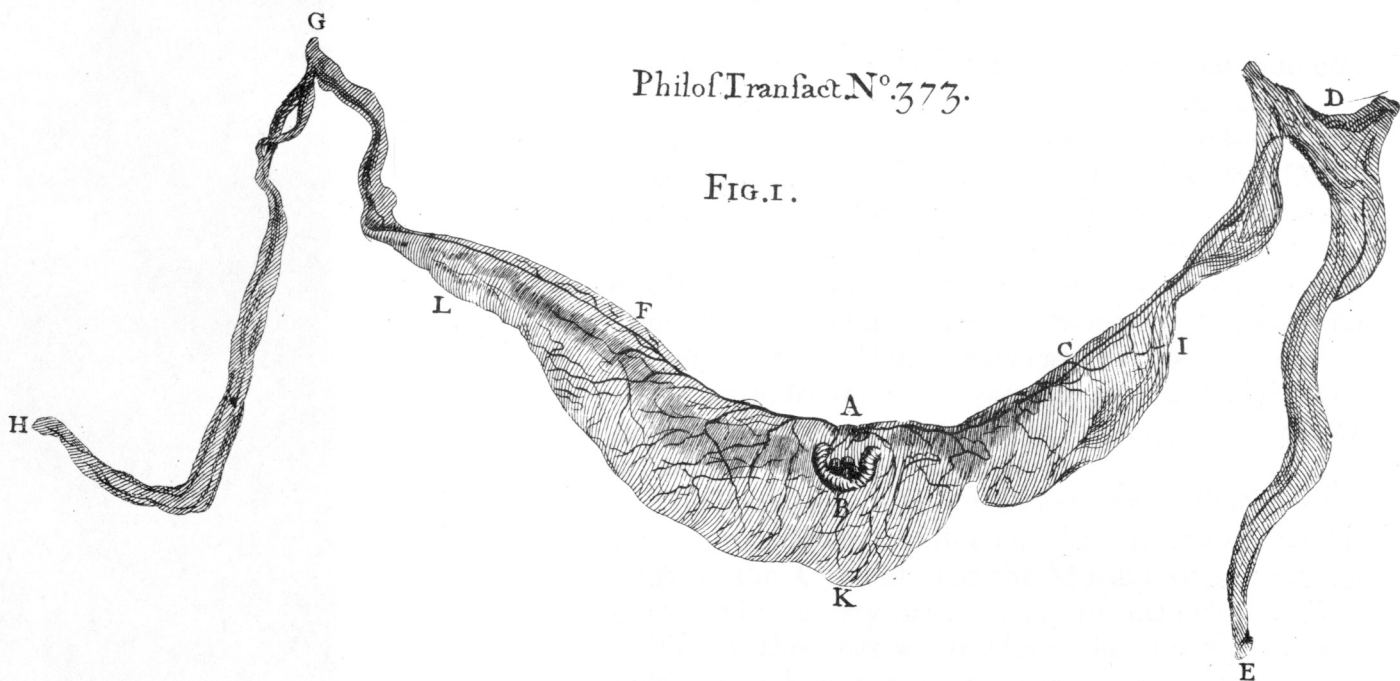


FIG. II.

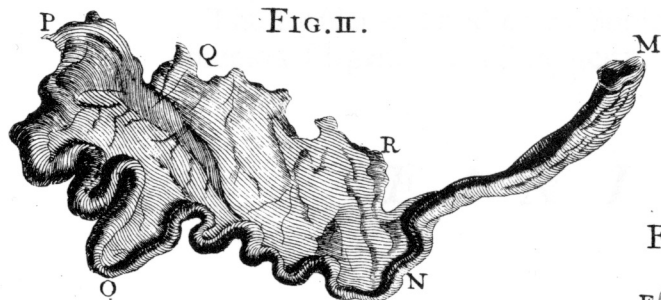


FIG. III.

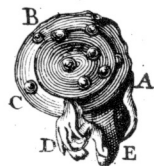


FIG. IV.



FIG. V.

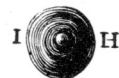


FIG. VII.

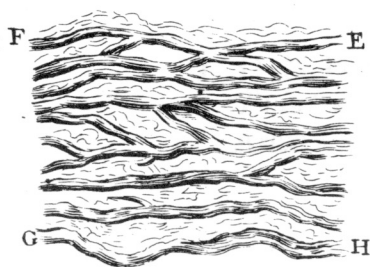


FIG. VIII.

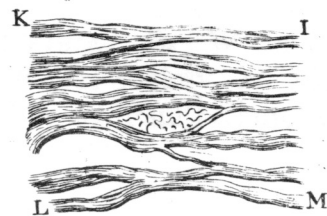


FIG. VI.

